Chapter 1: Introduction to Incommensurability Thesis

1.1 Origins of Incommensurability Thesis

The undisputable account of the historical origin of incommensurability thesis is ascribed to Feyerabend and Kuhn. They elaborated this thesis independently in 1962, in Feyerabend's *Explanation, Reduction, and Empiricist* and Kuhn's *The Structure of Scientific Revolutions*. These publications mark the bloom of post-positivists' accounts of philosophy of science against those of logical positivists', who believe in "a logic which could be studied without reference to the history of science." (Rorty 2001: 203). The emergence of incommensurability thesis pushes the historical school of philosophy of science to the radical extent of irrationalism and relativism. If this thesis is plausible, the theoretical foundation of rationalism will be destroyed since the rational theory choice and scientific progress will be in question. However, the blossom of historical school has cornered the legitimacy of science as a rational enterprise embarrassingly.

Feyerabend's concept of incommensurability is arisen from criticizing the empirical accounts of explanation and theoretical reduction of Hempel and Nagel (Preston 2002), both from the camp of positivist. According to Feyerabend, his concept of incommensurability is based on the contextual theory of meaning that borrowed from Wittgenstein's *Philosophical Investigations* (Preston 2002), a masterpiece which has a great impact on the ordinary language school. However, incommensurability thesis has been conceived in the mind of Feyerabend as early as in 1952:

> On one occasion which I remember vividly Anscombe, by a series of skilful questions, made me see how our conception (and even our perceptions) of well-defined and apparently self-contained facts may depend on circumstances not apparent in them. There are entities such as physical objects which obey a 'conservation principle" in the sense that they retain their identity through a variety of manifestations and even when they are not present at all while other entities such as pains and after images are 'annihilated' with their disappearance. The conservation principles may change from one developmental stage of the human organism to another and they may different for different languages (cf. Whorff's 'covert classifications' as described in Chapter 17 of *AM*). I conjectured that such principles would play an important role in science, that they might

> change during revolutions and that deductive relations between pre-revolutionary and post-revolutionary theories might be broken off as a result. (Feyerabend 1978: 114-115)

Despite Feyerabend ascribes the origin of his incommensurability thesis to *Philosophical Investigations*, he has noticed a remarkable divergence of his raw concept of incommensurability from later Wittgenstein's way of doing philosophy ('Look, don't think!', that is, an adoption of language-game to counteract the effect of his earlier essentialism developed mainly in *Tractatus Logico-Philosophicus*):

> I explained this early version of incommensurability in Popper's seminar (1952) and to a small group of people in Anscombe's flat in Oxford (also in 1952 with Geach, von Wright and L.L. Hart present) but I was not able to arouse much enthusiasm on either occasion. Wittgenstein's emphasis on the need for concrete research and his objections to abstract reasoning ('Look, don't think!') somewhat clashed with my own inclinations and the papers in which his influence is noticeable are therefore mixtures of concrete examples and sweeping principles. (Feyerabend 1978: 115)

Kuhn claims, in his *Commensurability, comparability, communicability*, that he and Feyerabend independently introduced the incommensurability concept into philosophy of science (Kuhn 1983, cited in Jacobs 2002: 106). Unlike Feyerabend, the source of Kuhn's incommensurability thesis is disputable, for he is vague on describing how the concept is acquired (Jacobs 2002: 106).

One argument is raised pertaining to the first occurrence of Kuhn's incommensurability thesis in his writings (Jacobs 2002: 106). Heilbron subscribes to a view that Kuhn's incommensurability concept has first emerged in his *The Copernican Revolution*, which was published in 1957 (Heilbron 1998, cited in Jacobs 2002: 106). However, Westman holds a converse opinion by articulating that the incommensurability concept is not yet formed in *The Copernican Revolution*, for

> 'scientific facts' for Kuhn 'appear to exist independently of concepts. Theories can organize facts, but they do not inevitably determine the character of observation. Thus in a revolution there is no change in the epistemological status

> of earlier observed phenomena: they are simply reorganized using different concepts'. (Westman 1994: 83, cited in Jacobs 2002: 106-107)

According to Jacobs, the divergence of the above views is based on the interpretation of Kuhn's statement pertaining to "his own understanding of the transformation of modern science" (Jacobs 2002: 106). Reading Aristotle in 1947 leads Kuhn in disclosing

> a global sort of change in the way men viewed nature and applied language to it, one that could not properly be described as constituted by additions to knowledge or by the mere piecemeal correction of mistakes. That sort of change was shortly to be described by Herbert Butterfield as 'putting on a different kind of thinking-cap,' and puzzlement about it quickly led me to books on Gestalt psychology and related fields. While discovering history, I had discovered my first scientific revolution... (Kuhn, 1997: xiii, cited in Jacobs 2002: 106)

It is obvious that the above passage refers to Kuhn's paradigm. Both Heilbron and Westman interpret and argue the origin of Kuhn's incommensurability concept in the light of paradigm. Jacobs has further commented that Kuhn's paradigm (incommensurability thesis) is greatly influenced by the writings of Alexandre Koyre (Jacobs 2002: 106). Apart from all this, Jacobs is in favor of Westman's viewpoint and inclines to hold that the mature sense of Kuhn's incommensurability thesis is emerged in *The Structure of scientific revolutions* (Jacobs 2002: 107). However, he seems to agree with Hoyningen-Huene that Kuhn was using the term incommensurability in 1961 for the first time (Jacobs 2002: 107), one year before the publication of *The Structure of scientific revolutions*.

In his *Polanyi's presagement of the incommensurability concept*, Jacobs combs through the philosophy of Polanyi for the evidence of the relation between Polanyi's view of "conceptual framework" and Kuhn and Feyerabend's incommensurability concept. Based on the findings, Jacobs concludes that Kuhn and Feyerabend's theme of incommensurability sprung from Polanyi's view of conceptual framework, by no coincidence (Jacobs 2002: 105).

> We know that Kuhn was acquainted with Polanyi's *Personal Knowledge* from quite early in the piece, referring favourably to one of its themes (tacit knowledge) in *The structure of scientific revolutions*. It is highly probable that Feyerabend commenced reading Polanyi's book at some time between 1958 (the year of its publication) and 1962, the year in which he and Kuhn presented the term 'incommensurability' in print. That both men knew Polanyi's book(and that Feyerabend read Polanyi's 'The stability of beliefs', in the 1950s one surmises) suggests that Polanyi's idea of the logical gap between frameworks of belief may well have conditioned Kuhn and Feyerabend as they developed their understandings of incommensurability. The resemblances between their notions of incommensurability and Polanyi's idea of the logical gap separating frameworks of belief are striking (Jacobs 2002: 116-117).

Jacobs believes that Kuhn had certainly read Polanyi's *Personal Knowledge* by July 1961, based on the following declaration made by Kuhn at the University of Oxford in that year (Jacobs 2002: 107):

> I have... recently recognized... [that] Mr. Polanyi himself has provided the most extensive and developed discussion I know of the aspect of science which led me to my apparently strange usage [of the word paradigm].
>
> In his perceptive and challenging book, *Personal knowledge,* Mr. Polanyi repeatedly emphasizes the indispensable role played in research by what he calls the 'tacit component' of scientific knowledge... I agree that neither the methodological nor the substantive requisites for sound research can be fully articulated... (Kuhn 1962: 392, cited in Jacobs 2002: 107)

On the contrary, Feyerabend seemed not obliged much to Polanyi's thought since Polanyi is totally omitted in *Killing time*, the autobiography of Feyerabend (Jacobs 2002: 107). "Polanyi is mentioned only once in *Against method* but none of his works is cited" (Jacobs 2002: 107). In Jacobs's implicit sense, Feyerabend is unethically obliterating the impact of Polanyi.

Jacobs persuasively demonstrates that Polanyi's idea of the logical gap between frameworks of belief foreshadows Feyerabend and Kuhn's incommensurability thesis. Jacobs shows that it is impossible for Polanyi's frameworks of belief to be evaluated

from within. He stresses that the conceptual framework can only be evaluated after its language has been exchanged for another (Jacobs 2002: 109). However, Polanyi argues that "no language can serve as a neutral medium for comparing belief systems embedded in other languages." (Jacob 2002: 110). There is inevitably a logical gap between conceptual frameworks. It seems to be a crisp rejection to meta-language, which is proposed as a measurement for theory selection in the case of the rivalry of two or more incommensurable theories. Hence, the existence of a logical gap between different conceptual frameworks, that is the thought of Polanyi, is corresponding to the incommensurability between different theories or paradigms, held by Kuhn and Feyerabend.

Apart from mere tracing the historical origin of incommensurability concept, Sankey points out that more focus shall be put on "why" (the cause of the emergence of incommensurability thesis) instead of "who" (the person who first developed the thesis).

> It is convenient to treat the year 1962 as the year in which the incommensurability thesis first emerged because that is when the thesis was first asserted in print by Kuhn and Feyerabend. But this is an oversimplification. Kuhn and Feyerabend drew on earlier developments in the philosophy and history of science as well as in philosophy at large. In many respects, the incommensurability thesis is a product of the philosophical climate of the late 1950's and early 1960's. This was a time that saw the rise of the discipline of the history of science, the influence of Gestalt psychology on the philosophy of perception, the decline of Vienna Circle positivism, the influence of the later Wittgenstein and Quine's attack on the analytic/synthetic distinction (Sankey 1999: 1).

The emergence of incommensurability thesis is unavoidable in the 1960s. It is primarily because the existing positivists and rationalists failed to overcome its accumulated contradictions and problems.

1.2 Overview of Incommensurability Thesis

It is controversial in defining the content and significance of the incommensurability thesis (Muhammad Ali Khalidi 2001: 172). According to Sankey, there is an inconsistent use of the term "incommensurability" among scholars:

> If one takes an overview of the critical literature concerned with the incommensurability thesis, it can hardly escape notice that this literature contains a variety of separate discussions that are conducted in quite different terms. Some authors write about the topic of meaning variance and content comparison. Some write about conceptual change and the intelligibility of alternative conceptual schemes. Others write about scientific realism and the continuity of reference of theoretical terms. And still others are concerned with the rationality of scientific theory choice, and the availability of objective standards of theory evaluation. (Sankey 1999: 4)

The complexity of the issue is arisen from the fact that incommensurability thesis is a fundamental thesis which underlies the philosophical account of scientific enterprise. It is not a thesis merely dealing with the comparability between theories. It has a far-reaching impact on the issues of scientific progress, theory/observation distinction (theory-ladenness of observation statement), theory selection, translation between theories, scientific realism/instrumentalism, and reductionism. These issues are defended positively by positivists, including logical positivists, logical empiricists and falsificationists, who subscribe to a general principle of rationalism. The broadest sense of rationalism is that scientific practice and outcome are governed by human's reason. If the argument of incommensurability thesis is valid and indispensable in the practice of science, the honorary status of science as a rational enterprise will be shaky.

Sankey sighs that the complexity of the incommensurability-related issues springs from the complexity of its definition:

> To answer this question [refers to the definition of incommensurability thesis] one way or the other is already to take a side in the dispute. The question of how to apply the concept of incommensurability in the present context is itself one of the

> questions at stake. Some parties to the dispute take incommensurability to be a relation that may obtain in its own right between theories, of which such things as meaning variance and lack of shared evaluative standards are mere aspects or constitutive parts. In contrast, other parties to the dispute treat the claim of incommensurability as consisting entirely in one or another of the various claims associated with talk of incommensurability, such as the claim that the content of alternative theories is unable to be compared due to meaning variance of the terms employed by the theories. (Sankey 1999: 3)

Sankey holds a pessimistic view that most of the debates among philosophers on incommensurability thesis are not fruitful dialogue. It is occasioned by the fact that a common platform for debate is not in place. Hence, philosophers argue the incommensurability thesis in their own light. Eventually, Sankey concludes that "not all parties to the dispute may understand the concept of incommensurability in the same way." (Sankey 1999: 3).

It is clear that philosophers are expected to have at least a minimal agreement on the nature of incommensurability before any solution can be provisioned to the issues raised by incommensurability thesis. In its mathematical context, incommensurable magnitudes imply the absence of a common unit of measurement (Sankey 1999). Unfortunately, philosophers' discussion of the incommensurability "rarely proceeds in accord with the mathematical concept of incommensurability."(Sankey 1999: 2).

However, it is fortunate a consensus of the general definition can be acquired albeit philosophers of science still debate about the exact content of incommensurability thesis. In its putative form, incommensurability thesis is a thesis regarding the incomparability between theories. However, this is far insufficient in defining the content of incommensurability. It is vague about the term "incomparability" and "theories" here. One might query the methodological respects of theory comparison. Some might question the focus of theory comparison (it is meaning or reference supposedly to be compared?). Others might even ask what constitutes a theory. Before I draw an unequivocal definition, let's examine some elaborations on incommensurability proposed by the scholars in the field.

The thought that theories are incommensurable is the thought that theories simply cannot be compared and consequently there cannot be any rationally justifiable reason for thinking that one theory is better than another... the thesis that theories are incommensurable is extremely implausible... because it suggests that I could never have rationally justifiable grounds for holding any belief whatsoever... (Newton-Smith 1981: 148)

The incommensurability thesis is the thesis that the content of some alternative scientific theories is incomparable due to translation failure between the vocabulary the theories employ. (Sankey 1997, abstract)

... discussion of incommensurability tends to be framed in terms of a range of concepts and considerations of a broadly semantic and epistemological nature. The discussion is frequently couched, for example, in terms of such factors as the incomparability of the content of scientific theories, variation in the meaning of scientific terms, translation failure between the vocabulary of theories, or absence of common standards of theory appraisal. (Sankey 1999: 2)

Incommensurability is frequently regarded as fundamentally a thesis about the meaning of (scientific) terms ... (Perovich 1991: 313)

The claim that two theories are incommensurable is then the claim that there is no language, neutral or otherwise, into which both theories, conceived as sets of sentences, can be translated without residue or loss (Kuhn 1983: 670, cited in Muhammad Ali Khalidi 2001: 173-174)

Many (if not all) such pairs [refers to old theory T' and new theory T] on closer inspection turn out to consist of elements which are incommensurable and therefore incapable of mutual reduction and explanation. (Feyerebend 1995: 77)

The classical, or absolute idea of mass, or of distance, cannot be defined within T'... *Not a single primitive descriptive term of T can be incorporated into T'*... the meanings of all descriptive terms of the two theories, primitive as well as defined terms, will be different: T and T' are *incommensurable theories*. (Feyerabend 1995: 115)

The incommensurability thesis is the thesis that terms used in another culture, say, the term "temperature" as used by seventeenth century scientists, cannot be equated in meaning and reference with any terms or expressions we possess. (Putnam 1981: 114, cited in Feyerabend 2002: 265)

This enumeration defines incommensurability from a narrow to wide sense. It is obvious that the first and the last quotation are of the broadest exposition, where the former

equates theory with daily belief; whereas one shall consider the cultural and societal factors when comparing terms in the latter quotation. The terms are compared on the ground of genesis and they are relative truth.

The exposition of incommensurability thesis from the cultural perspective (the first and last quotation above) is peripheral to its semantic and epistemological framework (third quotation above). For the broadest putative definition of incommensurability is the incomparability of theories. Theories are no doubt the subjects of epistemology in the first place. Hence, the unequivocal definition of incommensurability should be proposed in semantic and epistemological context. In this context, philosophers will encounter reference, meaning, and idea. These concepts were first introduced by Frege in mathematical logic and soon inspired Russell and Wittgenstein. Although Frege is a logician, his heritage has an enormous impact on Analytic tradition. This heritage is inherited into incommensurability thesis too, as the quotation 2, 3, 4, 5, 6, 7 above are dealing with reference and meaning (Frege's "idea" does not arise in the incommensurability debate. This concept of Frege has been one of the sources of Husserl's Phenomenology, which shapes the development of twentieth century continental philosophy), though might not strictly in Frege's sense.

Sankey summarizes the issues of incommensurability pertaining to reference and meaning as "semantic variance of the terms employed by theories." (Sankey 1999: 4). He names it as semantic incommensurability thesis. On the semantic ground, Sankey proposes another version of incommensurability, which he calls the methodological incommensurability thesis. The latter "is the thesis that alternative scientific theories may be incommensurable due to absence of common standards of theory appraisal." (Sankey 1999: 5). These two versions of incommensurability thesis, which define incommensurability and its objections, are described below in accordance with the thought of Sankey.

(a) Semantic incommensurability thesis

There are two kinds of scientific vocabulary introduced by logical positivists into philosophy of science, viz observational and theoretical vocabulary. Observational vocabulary is employed by scientists "to report upon observable phenomena and objects, which are directly perceived by means of their senses." (Sankey 2000: 1), such as 'red' (Sankey 2000). However, theoretical vocabulary is employed by scientists to refer to unobservable entities, such as 'electron' (Sankey 2000), which are "postulated by scientific theories to explain observable phenomena" (Sankey 2000: 1). Scientists are expected to deal with both observational and theoretical vocabulary, since they carry out experiments and formulate theories accordingly. It is the divergence in the treatment of the distinction between observational and theoretical vocabulary that mark logical positivists and post-positivists. The former group of philosophers is empiricists who hold that observational vocabulary "may be defined, as well as applied, on the basis of experience alone." (Sankey 2000: 2). They draw a distinct line between observational statements and theoretical statements. This view has been persuasively rebutted by post-positivists with the historical evidence showing that scientists observed the reality in their theoretical context. This post-positivists' view, namely theory-ladenness of observation, implies the semantic incommensurability thesis, which is presented as a challenge to rationalism. According to Sankey,

> The idea that the meaning of observational vocabulary depends on theoretical context has serious implications for the rationality of scientific theory choice. For if the meaning of observational terms depends on theoretical context, rather than being fixed independently of theory, then the meaning of such terms may vary with theory. In the absence of a semantically invariant observation language, which is neutral between theories, the problem arises of how to compare the empirical claims which alternative scientific theories make about the world. If there is no shared observation language, then what one theory says about the world may neither agree nor disagree with any empirical claim made by an alternative theory.... The thesis that the content of theories may be incomparable for semantic reasons is known as *the incommensurability thesis*. (Sankey 2000: 3)

It is to be noted that Sankey's semantic incommensurability entails a logical incomparability between (i) reality and theoretical statements. (ii) competing theories. For (i), the observational vocabulary changes when the theory which it depends is changed. Hence, there are no ways to know the reality as it is, since observational vocabulary does not necessary reflect the reality. In another words, theoretical statements are incapable to reveal the truth of reality. For (ii), scientists are unable to compare the merits of competing theories since there is no common neutral observational language. So Sankey's remark "what one theory says about the world may neither agree nor disagree with any empirical claim made by an alternative theory" (Sankey 2000: 3) implies that there is no logical relation between competing theories. They do not even contradict each other since they do not refer to a common entity in the reality. Kuhn has described it as "paradigm" in his *The Structure of scientific revolutions*.

Sankey has formulated semantic incommensurability in term of three aspects, viz meaning variance, translation failure, and content incomparability (Sankey 2000: 15). He generalizes the definitions of incommensurability as "... the content of alternative scientific theories [which] is unable to be compared because of translation failure due to meaning variance of their vocabulary" (Sankey 2000: 15).

(1) Meaning variance

Meaning variance makes possible two theories incomparable. In this respect, observational statements are theory-laden. They are not semantically neutral and independent from theoretical context. "Meaning is determined in a holistic manner, by means of the whole theoretical context in which the observational term is used." (Sankey 2000: 16). Therefore, "in the transition between scientific theories, there is change of meaning from one theory to the next." (Sankey 2000: 16). Hence, there is no common platform provided between theories for the direct comparison to be taken place. It is due to "... where the same terms occur in different theories, such terms will be employed with a different meaning in the context of each theory." (Sankey 2000: 16)

(II) Translation failure

According to Sankey, meaning variance itself is not persuasive to conclude that theories are incommensurable (Sankey 2000: 16-17). He holds that meaning variance between theories leads to the failure to translate between the vocabularies of theories (Sankey 2000: 17). Translation failure happens due to the radical meaning change between theories, which is, "no term of one theory has the same meaning as any term of the other theory." (Sankey 2000: 17)

(III) Content incomparability

According to Sankey, content incomparability is the consequence of meaning variance and translation failure (Sankey 2000: 17). Scientists are unable to compare the content between theories, and rational theory choice is impossible. It is because "there may be neither agreement nor disagreement between theories." (Sankey 2000: 17). Hence, Sankey concludes that "... the content of such theories is not directly comparable." (Sankey 2000: 18). However, this conclusion does not mean that theories cannot be compared at all, for the translation failure between theories may either "... in whole or in part..." (Sankey 1999a: 1).

Based on the above mentioned three aspects of semantic incommensurability, Sankey formulates the incommensurability thesis in the following lucid way:

> Two alternative scientific theories are incommensurable just in case:
> (i) the meaning of the vocabulary employed by theories varies between theories,
> (ii) translation is impossible from the vocabulary of one theory into the vocabulary of the other,
> (iii) as a result of (i) and (ii), the content of such theories may not be compared. (Sankey 2000: 18)

To simplify, theories are deemed incommensurable when they "do not share a common language, or that the terms they employ do no have common meaning." (Sankey 1999a: 1)

(b) Methodological incommensurability thesis

Methodological incommensurability is the second version of incommensurability thesis which "there are no shared, objective methodological standards of scientific theory appraisal" (Sankey 1999: 10). In another words, there are multiple methodological standards in theory appraisal. The advocates of this view are labeled as relativists (Sankey 1999: 10), such as later Feyerabend (Preston 1997) and Kuhn.

This version of incommensurability thesis "arises out of rejection of the traditional view that there is a uniform, invariant scientific method, employed throughout science..." (Sankey 1999: 10). The advocates of this view claim that there is no fixed scientific method available for the scientists who favor competing theories. The consequence is the emergence of the problem of rational theory-choice, which is a "problem of whether choice of theory by a scientist may be objectively rational in the absence of an invariant scientific method." (Sankey 1995: 1).

> If one theory is supported by one set of standards, and the rival by another, and there is no higher set of standards, then there would appear to be no basis for a rational choice between such theories. In the end, a radical epistemological relativism may seem unavoidable... (Sankey 1995: 3)

However, absence of an invariant scientific method does not necessary lead to irrational theory choice process, which involves steps in making judgment and deliberation (Sankey 1999: 11). Scientist A embraces method M1 may favor theory T1, whereas scientist B embraces method M2 may favor theory T2. There is no common ground to adjudicate the superiority of one theory over another, for there is an absence of invariant

scientific method. Hence, the theory choice of both scientists is not underlain by any rational basis. However, the theory choice process of scientist A and scientist B may not be irrational, for they make their judgment on the virtue of one theory over another in their own light of methodological standard.